



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/602,938	06/24/2003	Thompson M. Sloane	GP-303216	1828

7590 09/10/2004

General Motors Corporation
Legal Staff, Mail Code 482-C23-B21
300 Renaissance Center
P. O. Box 300
Detroit, MI 48265-3000

EXAMINER

ESHETE, ZELALEM

ART UNIT PAPER NUMBER

3748

DATE MAILED: 09/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/602,938	Applicant(s) SLOANE ET AL.	
	Examiner Zelalem Eshete	Art Unit 3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 20-35 is/are rejected.
- 7) ☒ Claim(s) 18, 19 and 36 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1,2,8-14,17,20,24-28,34,35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dahung (EP 0643209) in view of Bundrick (4,419,969) and further in view of Gonzalez (4,765,293).

Regarding claims 1,12,13: Dahung discloses a method of operating a homogeneous-charge compression ignition (HCCI) engine, comprising: mixing air, and a plurality of fuel to form a combustion mixture; and compressing said combustion mixture, releasing energy and converting said combustion mixture to exhaust gas and exhausting the exhaust gas as is inherent in engines (see figure 1). Dahung further discloses high load condition and low load condition and controlling the supply of the plurality of fuels depending on the load condition.

Dahung fails to disclose one of the fuels is acetylene-based component and concurrent injection.

However, Bundrick teaches the use of acetylene in the compression ignition (see column 2, lines 15 to 18).

Art Unit: 3748

Gonzalez further teaches the pilot and main injections timings may be concurrent or staged depending application parameters (see column 2, line 67 to column 3, line 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Dahung by using acetylene as taught by Bundrick in order to utilize a wide variety of fuels available for the production of energy. It also would have been obvious to further employ an injection timing of staged or concurrent depending on application parameters as taught by Gonzalez in order to enhance the engine performance.

Regarding claim 27: Dahung as modified above discloses the claimed invention as recited above; and Dahung further discloses a vehicle driven by a homoneneous-charge compression ignition engine comprising: plurality of fuel supplies, a cylinder having a piston reciprocally driven therein, the cylinder receiving a combination mixture of air, main fuel, and pilot fuel, wherein the piston compresses the combustion mixture to induce auto-ignition of the combustion mixture (see figure 1; abstract; column 1, lines 1 to 10).

Regarding claims 2,14,28: Bundrick discloses the fuel consists essentially of acetylene (see column 2, lines 15 to 18).

Regarding claims 8,24: Dickey discloses drawing the combustion mixture into a cylinder of the HCCI engine, in that he discloses the mixing prior to introducing into the combustion chamber (see column 8, lines 36 to 42).

Regarding claims 9,25: Dahung discloses mixing the combustion elements within the cylinder of the engine (see figure 1).

Regarding claims 10,11,26,34: Dahung in view of Bundrick discloses the claimed invention except for the claimed numerical values. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the claimed numerical values based on the application, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 17: Dahung as modified above discloses controlling a supply of the acetylene-based component comprises maintaining a consistent supply regardless of the load, in that he discloses supply of the main and pilot fuels at any load condition (see abstract).

Regarding claim 20: Dahung as modified above discloses controlling a mixture amount of the fuel comprises reducing the mixture amount as the load decreases, as it

Art Unit: 3748

is inherent in engine performance to require higher fuel mixture at higher load and lower fuel mixture at lower load.

Regarding claim 35: Dahung as modified above discloses the amount of the acetylene-based component varies based on a load of the engine, in that both fuels are administered based on the load conditions (see column 8, lines 1 to 23).

3. Claims 3,15,29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dahung in view of Bundrick and further in view of Gonzalez and further in view of Britton (6,314,925).

Dahung in view of Bundrick and further in view of Gonzalez disclose the claimed invention except the use of hydrogen.

However, Britton teaches the hydrogen and acetylene exhibit higher flame speed (see column 8: lines 22 to 24).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Dahung in view of Bundrick, and further in view of Gonzalez's system by utilizing hydrogen as taught by Britton in order to improve the combustion process.

Art Unit: 3748

4. Claims 4,16,30,31,32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dahung in view of Bundrick and further in view of Gonzalez and further in view of Dickey (5,832,880).

Regarding claims 4,16,30: Dahung in view of Bundrick and further in view of Gonzalez disclose the claimed invention except the use of EGR.

However, Dickey teaches the use of EGR in compression ignition (see figure 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Dahung in view of Bundrick and further in view of Gonzalez's system by utilizing EGR in order to improve engine efficiency.

Regarding claim 31: Dickey discloses an inlet valve movable between an open position and a closed position, wherein when the open position the inlet valve enables a flow of the combustion mixture into the cylinder (see figure 1).

Regarding claim 32: Dahung as modified above discloses the claimed invention as recited above and further discloses a fuel injector for the main fuel and a fuel injector for a pilot fuel to inject specific amount of fuels at specific timing (see figure 1; abstract).

5. Claims 5,6,21,22,33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dahung in view of Bundrick and further in view of Gonzalez and further in view of Bromberg et al. (5,409,784).

Dahung in view of Bundrick and further in view of Gonzalez disclose the claimed invention; however, fails to disclose producing the acetylene-based component using a plasma generator that uses a voltage and a frequency.

However, Bromberg teaches using plasma generator to produce acetylene by using voltage and frequency (inherent) (see figure 11).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Dahung in view of Bundrick and further in view of Gonzalez's system by using a plasma generator to produce acetylene as taught by Bromberg in order to convert hydrocarbon fuels.

6. Claims 7,23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dahung in view of Bundrick and further in view of Gonzalez and further in view of Ethington et al. (4,690,743).

Dahung in view of Bundrick and further in view of Gonzalez disclose the claimed invention; however, fails to disclose producing the acetylene-based compound with a thermal reactor.

However, Ethington teaches producing acetylene using a reformer or a thermal reactor (see column 12, lines 29 to 39).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Dahung in view of Bundrick and further in view of

Gonzalez's system by producing acetylene using a reformer as taught by Ethington as an alternative means of producing acetylene.

7. Claims 7,23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dahung in view of Bundrick and further in view of Gonzalez and further in view of Lowther et al. (4,965,052).

Dahung in view of Bundrick and further in view of Gonzalez disclose the claimed invention; however, fails to disclose producing the acetylene-based compound with a thermal reactor.

However, Lowther teaches producing acetylene using engine reactor (see column 2, lines 3 to 7).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Dahung in view of Bundrick and further in view of Gonzalez's system by producing acetylene using an engine reactor as taught by Lowther as an alternative means of producing acetylene.

Allowable Subject Matter

8. Claims 18,19,36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

9. Applicant's arguments with respect to claims 1-36 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zelalem Eshete whose telephone number is (703) 306-4239. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Denion can be reached on (703) 308-2623. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Zelalem Eshete
Examiner
Art Unit 3748

Z

Thomas Denion
THOMAS DENION
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3700